Major Workflow Steps in GEOS-DAS

This note describes the high level steps performed by GEOS-DAS. It is intended as a first introduction to what happens under the hood when executing a g5das.j batch script.

--g5das.j <- Main batch job script

------Set environment variables and working directories

------Loop through each time segment for the current PBS job:

----------Create a $FVWORK directory, and create symbolic links to chem restart files

----------Call fvpsas script to run the analysis system

----------If fvpsas returns with an error, save snapshot of $FVWORK directory in $FVHOME/morgue directory

----------Delete old restart files and copy the new restart files for the next analysis cycle

----------Call pesto to prepare archival of analysis data from $FVWORK

----------Run fvarchive.j to copy files to mass storage, and to scour old data

----------Delete the $FVWORK directory

----------Advance to next time segment

------Resubmit g5das.j for next PBS segment

The fvpsas script performs the following steps:

--fvpsas

------Copy resource and template files to the $FVWORK directory

------Copy analysis restarts to $FVWORK directory (i.e., the satbang and satbias txt files, plus the 03, 06, and 09 background eta and sfc hdf files)

------Copy the .bin restart files (acgm_import, fvcore_internal, etc.) to the $FVWORK directory

------Call the lnbcs script to link boundary condition files (SST, ice temperature, sea ice fraction, SEAWIFS, chemical species, tile data, LAI/Greenness,

visdf, nirdf, topo-DYN, topo-GWD, topo-TRB)

------Determine date and times for the overall experiment, the current segment, the GCM, and the analysis

------Submit a batch script that runs acquire_obsys, which fetch BUFR observation files from mass storage

------Call FixUnblocked.csh which "blocks" the BUFR files, i.e., inserts f77 control words so the BUFR files can be process on SGI machines

------Call Reblock.csh to byteswap blocked BUFR files

------Call combfrd.x to concatenate multiple pre-qc BUFR files (surface obs, upper air, wind profiler, aircraft, ACARS, and VAD winds only)

------Call scanbuf0.x to scan concatenated pre-qc BUFR file and write out number of reports by type

------Call fvana script to perform quality control and analysis

------Call makeiau.x to calculate A-F field when IAU is requested

------Call dyn2rs5.x to convert GSI analysis to GCM restart files when IAU is **not** requested

------Call dyn2dyn.x for asynoptic backgrounds (reads dynamics vector and writes out as 32-bit interpolated)

------Call cnv2prs.pl (script wrapper for lcv2prs.x) for converting data from fv coordinates to pressure levels).

------Convert GSI observation diagnosis files to ODS format

The fvana script performs the following steps:

--fvana

------Call the ssprepqc script to automate the NCEP Complex Quality Control on the pre-qc BUFR file

------Call the analyzer script to automate the analysis

The ssprepqc script performs the following steps:

--ssprepqc

------Call fv2ss.x to convert background data from fv coordinates to spectral space (required for QC programs)

------Call prevents.x to perform rudimentary checks on the pre-QC BUFR observations, adds the forecast (first guess) interpolated to each observation location,

adds observation error (from look-up tables) to each observation, performs rough quality control checks on surface pressure (vs the background), converts

dry bulb temperature to virtual temperature, and dew point temperature to specific humidity for surface data.

------Call cqcbufr.x to perform QC on BUFR radiosonde data, converts dry bulb temperature to virtual temperature, and converts dew point temperature to specific

humidity.

------Call raobcore.x to apply Haimbert temperature correction scheme to BUFR radiosonde data

------Call hradcore.x to further adjust BUFR radiosonde temperature profile as function of season (optional)

------Call profcqc.x to perform QC on BUFR profiler data (including checks for bird migration)

------Call prepacqc.x to perform QC on BUFR aircraft data (other than ACARS/MDCRS)

------Call acarsqc.x to perform QC on BUFR ACARS/MDCRS data

------Call cqcvad.x to perform QC on BUFR VAD wind data

------Call oiqcbufr.x to perform OI-based quality control on all BUFR radiosonde, profiler, aircraft, ACARS, and VAD data.

The analyzer script performs the following steps:

--analyzer

------Call make_satinfo.x to construct satellite-related data files for gsi.x and sac.x

------Symbolically link look-up tables for gsi.x and sac.x

------Call lnlist to symbolically link observation BUFR files (both QC and satellite data)

------Call gsi.x to create analysis from observations and background field

------Call sac.x to update satellite angular correction

------Call ana5sfc.x to generate surface analysis